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What Causes Difficulties in Listening Comprehension for Japanese Learners of English

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1. Introduction

In connected speech, words often blend together and elision and changes of sounds occur to make articulation more efficient and to enhance the smooth transition from one word to the next (Avery and Ehrlich 1992:84). As a result, word boundaries become indiscernible and a group of words sound like one word with no break. For example, 'soup or salad' /su:p ə sæləd/ sounds like 'souper-salad' /su:pə sæləd/ and 'I'll ask her' /aɪl æsk ə/ sounds like 'Alaska' /əlæskə/.

Among various connected speech phenomena, consonant-to-vowel and consonant-to-consonant linking across word boundaries and elision of vowels and consonants present great difficulty for Japanese learners of English since these phenomena occur only in certain circumstances in Japanese. The syllable structure of Japanese is basically a sequence of VC (a consonant followed by a vowel) and words do not end with a consonant. Japanese does not accept consonant clusters, and the vowel /u/ is used as a default epenthetic vowel when pronouncing foreign words with clusters (Hirose and Dupoux 2004). On the other hand, English has a wide configuration of consonant clusters, and a word can end with either a vowel or a consonant. Consonant clustering presents great difficulty to Japanese learners of English (Celce-Murcia 2010: 98-100). In this article, possible causes that make listening comprehension difficult for Japanese learners of English will be listed and their levels of difficulty will be examined with the results of 50 dictation questions given to 44 Japanese college students.

Seven types of possible causes that make listening comprehension difficult are listed below (Table 1). The first type is consonant-to-vowel linking, which makes word boundaries unclear. The second type is elision, which makes a sound or a group of sounds dropped. The third type is weak forms of function words, which often centralizes vowels and elides both vowels and consonants. The fourth is inaudible release of plosives in word-final positions before a pause. The fifth is consonant-to-consonant linking, which makes two consonants at word boundaries sound like one consonant. The sixth is assimilation, which changes the sound of one or both of the two consonants at word boundaries. The seventh is T-voicing (aka intervocalic alveolar flapping), which changes /t/ to flap /ɾ/.

Table 1.

1) Consonant-to-Vowel Linking	
Intervocalic consonant sharing in VC+V	'keep <u>u</u> t'
Resyllabification in CC+V	'find <u>u</u> t'
2) Elision	
Elision of Vowels	
Interconsonantal vowels	'potato' /pətertou/ ⇒ /ptertou/
Syllabic consonants	'sudden' /sʌdən/ ⇒ /sʌdn/
Aphesis	'about' /əbaʊt/ ⇒ /baʊt/
Elision of Consonants in CC+C	
Elision of /t, d/ in consonant cluster	'last chance' /læs tʃæns/
Loss of past tense marker	'walked back' /wɔ:k bæk/
Other Elisions	
Negative /nt/ reduction	'you mustn't lose it.' /mʌsn lu:z/
Intervocalic /nt/ reduction	'went away' /wenəweɪ/
Elision of /θ, ð/	'clothes' /kloʊz/
Elision of /v/	'a piece of paper' /ə pi:s ə peɪpə/ 'give me' /gɪ mi/
Unstressed syllables (Haplology)	'probably' /prɑ:bəbli/ ⇒ /prɑ:bli/
Unstressed syllables (Initial)	'because' /bɪkʌz/ ⇒ /kəz/
3) Weak forms of function words	
/h/-dropping	'Tell him.' /hɪm/ ⇒ /ɪm/
th-dropping	'get them' /getəm/
/v/-dropping	'cup of tea' /kʌpəti:/
/d/-dropping	'you and I' /jʊənai/, /jʊnai/
4) Inaudible release of plosives in word-final position	'This is my right.' 'This is my ride.'
5) Consonant-to-consonant linking in C+C	
Geminate consonant linking	'less serious' /les:ɪriəs/
Plosive + consonant linking	'pet cat' [pet ^ɾ kæt], 'at night' [ə ^ɾ naɪt]
6) Assimilation	
Assimilation of place of articulation	'hot potato' /hɒp pətertou/, /hɒ ^ɾ pətertou/
Final obstruent devoicing	'have to' /hæf tə/
Coalescent assimilation	'I need you.' /ni:dʒu/
Assimilation of manner of articulation	'that side' /ðæs saɪd/
7) T-voicing (Intervocalic alveolar flapping)	'cut it out' /kʌɪ ɪ əʊt/

2. Linking

Linking (or liaison) is the connecting of the final sound of one word or syllable to the initial sound of the next (Celce-Murcia 2010: 165). It occurs across word boundaries in the sequence of V+V (e.g. blueink), C+V (e.g. skipit), and C+C (e.g. hotcake) (Brown 2006: 285). The V+V sequence does not cause much trouble to Japanese learners since Japanese is an open-syllable type language and the VV sequence at word boundaries is common. The V+V sequence in English does not elide or change sounds, but a junctural [ɨ] or [ʷ] glide is sometimes inserted between vowels. On the other hand, the C+V and C+C sequences across word boundaries cause great difficulty since syllables in Japanese do not end with a consonant except for /N/, which does not link to a vowel.

2.1. Consonant to vowel linking

English can take various sequences of consonants and vowels across word boundaries: VC+V, CC+V, C+C, and CC+C. The VC+V sequence makes word boundaries indiscernible (e.g. ‘Comeonin’). The CC+V sequence moves the final consonant over to the next syllable and makes the word boundary unclear (e.g. ‘find out’ /faɪnd aʊt/⇒/faɪn daʊt/).

2.1.1. Intervocalic consonant sharing in VC+V sequences

The consonant in the VC+V sequence (word-final VC sequence followed by word-initial vowel) is often produced as if it belonged to both syllables (e.g. ‘keepout’ /ki:paʊt/) (Rogerson-Revel 2011: 169, Celce-Murcia 2010: 166-167, Avery and Ehrlich 1992: 85). When this occurs, word boundaries become indiscernible. Table 2 shows various VC+V sequences.

Table 2. VC+V linking

Labial + V		Dental + V		Alveolar + V		Palato-alveolar + V		Velar + V	
/p/	stop it	/θ/	beneath it	/t/	put out	/ʃ/	cash it	/k/	back out
/b/	grab it	/ð/	with it	/d/	read out	/ʒ/	camouflage it	/g/	drag out
/m/	come in			/s/	pass out	/tʃ/	catch it	/ŋ/	sing it
/f/	laugh about			/z/	Does it?	/dʒ/	damage it		
/v/	leave early			/n/	run around				
				/l/	fool around				
				/r/	fair enough				

(Adapted from Avery and Ehrlich 1992: 85)

2.1.2. Resyllabification in CC+V sequences

In the CC+V sequence (word-final consonant cluster followed by word-initial vowel), the final consonant is often pronounced as part of the following syllable (Celce-Murcia 2010: 167). For example, ‘movedit’ is pronounced /mu:v dɪt/ rather than /mu:vd ɪt/ and ‘findout’ /faɪnd aʊt/ sounds like ‘fine doubt’ /faɪn daʊt/. This is a strategy to simplify consonant clusters by breaking up a final consonant cluster and move the final consonant over to the next syllable (Celce-Murcia 2010: 101).

3. Elision

Elision is the process of elimination or dropping of phonemes (both vowels and consonants) or whole syllables that would be present in the citation form of a word or phrase (Brown 2006: 284, Crystal 2008: 166). It is most often found in unstressed function words (e.g. ‘and’ /ænd/⇒/ən, n/), unstressed syllables in polysyllabic words (e.g. ‘philosophy’ /fələsəfi/⇒/fələsfi/), and complex consonant clusters (e.g. ‘twelfths’ /twelfθs/⇒/twelθs/ or /twelfs/, ‘steamed pudding’ /sti:md pudɪŋ/⇒/sti:m pudɪŋ/). Elision may occur word-initially (aphesis) (e.g. ‘again’ /əgen/⇒/gen/), word-medially (syncope) (e.g. ‘interesting’ /ɪntərestɪŋ/⇒/ɪntrɪstɪŋ/) or word-finally (apocope) (e.g. ‘of’ /ʌv/⇒/ə/) (Hagen1988: 5, Celce-Murcia 2010: 173).

3.1. Elision of vowels

Elision of vowels occurs in three environments (Table 3). Vowels are usually elided or sometimes devoiced when a short, unstressed vowel occurs between voiceless consonants (e.g. ‘potato’ /pətərtou/⇒/ptertou/) (Roach 2009b: elision). Similar phenomena can be found in Japanese as well. Vowels /i/ and /u/ are often devoiced or sometimes elided when they are between voiceless consonants /k, s, t, h, p/ (e.g. ‘suki’ /suiki/⇒/sʰuki/, ‘hito’ /hito/⇒/hʰito/). When a sequence of voiceless consonant + /i, u/ + voiceless consonant repeats more than twice (e.g. ‘kutsushita’ /kʊtsuɕita/), not all vowels are devoiced; rather it is likely that every other vowel or every three vowels is voiced to avoid consonant cluster (e.g. ‘kutsushita’ /kʊtsuɕita/, ‘pichipichishita’ /pɪtɕipɪtɕɪta/ (Isomura 2009: 56-57). Also, /u/ of ‘desu’ /desu/ (formal non-past copula) and ‘masu’ /masu/ (formal non-past marker for verbs) are often devoiced, [desʰ] and [masʰ] respectively, or may be dropped completely, [des] and [mas] (Isomura 2009: 52-57).

In English, elision of vowels also happens when a vowel in an unstressed syllable is incorporated into a syllabic consonant, occurring between an obstruent consonant and a sonorant consonant (e.g. nasal, lateral), resulting in a syllabic nasal (e.g. ‘sudden’ /sʌdən/ ⇒/sʌdn/) or syllabic /l/ (e.g. ‘bicycle’ /baɪsɪkəl/ ⇒/baɪsɪkl/) (Celce-Murcia 2010: 172, Roach 2009: 113-114, Giegerich 1992: 287, Rogerson-Revell 2011: 166). Also, an unstressed vowel at the beginning of a word is sometimes elided (e.g. ‘exactly’ /ɪgzæktli/⇒/gzæktli/).

Table 3. Elision of vowels

Interconsonantal vowels (between voiceless consonants)	‘potato’ /pətərtou/⇒/ptertou/
Syllabic consonants	‘sudden’ /sʌdən/⇒/sʌdn/
Aphesis (initial unstressed vowels)	‘about’ /əbaʊt/⇒/baʊt/

3.2. Elision of consonants in CC+C sequence

Elision of consonants in English occurs most commonly when a speaker simplifies a complex consonant cluster (Table 4). One of the simplification strategies is cluster reduction, where a middle consonant in the cluster of three consonants (CC+C) is dropped (Roach 2009b: elision). For example, ‘steamed pudding’ (stea [md p] uding) becomes /sti:m pudɪŋ/ with /d/ in the cluster of /mdp/ being dropped (SCEP 2012 *Hnadbook*: 66).

Table 4. Consonant cluster C+/t, d/+C and consonant elision

Fricatives				
/f/	/t/	C	‘left wheel’	/left wi:l/ ⇒ /lef wi:l/
/s/			‘last chance’	/læst tʃæns/ ⇒ /læs tʃæns/
/ʃ/			‘finished now’	/fɪnɪʃt naʊ/ ⇒ /fɪnɪʃ naʊ/
/θ/			‘mouthed silently’	/maʊθt saɪləntli/ ⇒ /maʊθ saɪləntli/
/v/	/d/	C	‘moved back’	/mu:vd bæk/ ⇒ /mu:v bæk/
/z/			‘refused both’	/rɪfju:zd boʊθ/ ⇒ /rɪfju:z boʊθ/
/ʒ/			‘camouflaged trucks’	/kæməflɑ:ʒd trʌks/ ⇒ /kæməflɑ:ʒ trʌks/
/ð/			‘breathed deeply’	/bri:ðd di:pli/ ⇒ /bri:ð di:pli/
Plosives/Affricates				
/p/	/t/	C	‘kept quiet’	/kept kwaɪət/ ⇒ /kep kwaɪət/
/k/			‘attract me’	/ətrækt mi/ ⇒ /ətræk mi/
			‘walked back’	/wɔ:kt bæk/ ⇒ /wɔ:k bæk/
			/tʃ/	‘attached list’
/b/	/d/	C	‘dubbed film’	/dʌbd fɪlm/ ⇒ /dʌb fɪlm/
/g/			‘lagged behind’	/lægd bihaɪnd/ ⇒ /læg bihaɪnd/
/dʒ/			‘judged fairly’	/dʒʌdʒd ferli/ ⇒ /dʒʌdʒ ferli/
			Nasals	
/n/	/t/	C	‘went down’	/went daʊn/ ⇒ /wen? daʊn/
/m/			‘You mustn’t lose it.’	/məsnt lu:z ɪt/ ⇒ /məsn lu:z ɪt/ (NEGATIVE /-nt/)
			‘dreamt wild dreams’	/dremt waɪld dri:mz/ ⇒ /drem waɪld dri:mz/
/n/	/d/	C	‘bend back’ /bend bæk/	/bend bæk/ ⇒ /ben bæk/
			‘warned them’	/wɔ:nd ðəm/ ⇒ /wɔ:n ðəm/
/m/			‘They seemed glad.’	/si:md glæd/ ⇒ /si:m glæd/
/ŋ/			‘hanged men’	/hæŋd men/ ⇒ /hæŋ men/
Lateral				
/l/	/d/	C	‘hold tight’	/hoʊld taɪt/ ⇒ /hoʊl taɪt/ ‘old man’, ‘cold lunch’
			‘called them’	/kɔ:ld ðəm/ ⇒ /kɔ:l ðəm/

The word-final /t/ or /d/ in clusters of two or more consonants at word boundaries is often elided when followed immediately by a word beginning with a consonant other than /h/ (e.g. 'last chance' /læs tʃæns/) (Celce-Murcia 2010: 172, Tench 2011: 95, Collins and Mees 2003: 210-211). /t/ is often elided in a word-final cluster of voiceless continuant (/s, f, ʃ/) or voiceless plosive/affricate (/p, k, tʃ/) + /t/ + word-initial consonant (e.g. 'next day', 'looked like'). In the same way, /d/ is often elided in a sequence of voiced continuant (/n, m, l, z, ð, v/) or voiced plosive/affricate (/b, g, dʒ/) + /d/ + word-initial consonant (e.g. 'bend back', 'rubbed gently') (Cruttenden 2008: 304). In a sequence of three plosives (two final plosives + initial plosive), the central plosive, which is always alveolar /t/ or /d/, has no audible closing or release stage. /t/ in this position is realized only by a period of silence. /t, d/ may be dropped completely (e.g. 'wept bitterly', 'jogged by') (Cruttenden 2008: 166, Collins and Mees 2003: 158).

Elision of word-final /t/ or /d/ eliminates the past tense marker when followed by a word-initial consonant (Cruttenden 2008: 304, Tench 2011: 96-97). For example, ‘he looked back’ and ‘he look back’ sound identical in connected speech. (Rogerson-Revell 2011: 167). /t/ does not readily get elided if the elision would bring two /s/s together at the end of a word (e.g. ghosts /goʊsts/), but /t/ may be elided across word boundaries (e.g. ‘most surprising’ /moʊs səˈpraɪzɪŋ/) (Tench 2011: 98).

Other types of consonant elision include negative /nt/ reduction, intervocalic /nt/ reduction, elision of /θ/ and /ð/ in /θs/ and /ðz/ sequences, elision of /v/ in ‘of’ and /v/ before /m/, and elision of initial unstressed syllables (Table 5-8).

Table 5. Intervocalic /nt/-reduction

‘twenty’	/twenti/ ⇒ /tweni/	‘identify’	/aɪdentɪfaɪ/ ⇒ /aɪdenɪfaɪ/
‘Internet’	/ɪntənɪt/ ⇒ /ɪnənɪt/	‘winter’	/wɪntə/ ⇒ /wɪnə/
‘went away.’	/went əweɪ/ ⇒ /wen əweɪ/		
‘want to’	/wɑːnt tuː/ ⇒ /wɑːnt tə/ ⇒ /wɑːnttə/ ⇒ /wɑːntə/ ⇒ /wɑːnə/		
‘going to’	/ɡoʊɪŋ tuː/ ⇒ /ɡoʊɪn tə/ ⇒ /ɡoʊɪn nə/ ⇒ /ɡoʊnə/ ⇒ /ɡənə/		
‘mantle’	/məntl/ ⇒ /mæn/		

Table 6. Elision of dental fricatives /θ, ð/

Dental Fricative /θ, ð/ + Alveolar Fricative /s, z/ ⇒ /s, z/			
/θ/	/s/	‘months’	/mʌnθs/ ⇒ /mʌns/
/ð/	/z/	‘clothes’	/kloʊðz/ ⇒ /kloʊz/

Table 7. Elision of /v/

‘of’ + Consonant		
/v/	/ð/	‘seven of those apples’ /sevən ə ðoʊz æplz/
	C	‘a piece of paper’ /ə piːs ə peɪpə/
‘give’ ‘have’ ‘leave’ + /m/ (See 5.6 Assimilation of manner of articulation)		
/v/	/m/	‘give me a chance’ /ɡɪ mi ə tʃæns/
		‘Do you have my number?’ /hæ maɪ nʌmbə/
		‘Leave me alone.’ /liː mi əloʊn/

Table 8. Elision of unstressed syllables

Unstressed syllables (Haplogy)	‘probably’ /praːbəbli/ ⇒ /praːbli/
Initial Unstressed syllables	‘because’ /bɪkəz/ ⇒ /kəz/

Negative /nt/ reduction: /t/ in the negative /-nt/ sequence is often elided before a consonant and sometimes before a vowel (e.g. ‘you mustn’t lose it’ /mʌsn luːz/, ‘you mustn’t over-eat’ /jʊ mʌsn oʊvəɪt/) (Cruttenden 2008: 304). /t/ is now often replaced by a glottal stop when followed by any consonant except /h/ (e.g. ‘I don’t believe it’ [daʊn? bliːv]) or assimilates to the following phoneme (/doʊmp bliːv/) (Tench 2011: 119, Cartier 1967: 52). /t/ in the final clusters of /-nt, -lt/ followed by a consonant (/ -nt, -lt/ + C) is not normally elided, but is glottally reinforced or replaced by a glottal stop (‘spent time’ [spen²t taɪm] or [spen? taɪm], ‘Walt Disney’ [wɔːl²t dɪzni] or [wɔːl? dɪzni]) (SCEP 2012 *Hnadbook*: 66, Cruttenden 2008: 304).

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Intervocalic /nt/ reduction: Alveolar plosive /t/ in the /nt/ sequence between two vowels or before a syllabic /l/ is often dropped in connected speech, assimilating to the preceding alveolar nasal /n/ (Celce-Murcia 2010: 81, 172, Matsuzaka 1986: 138-39). For example, 'twenty' /twenti/ may be pronounced /tweni/ (Celce-Murica 2010: 172, *John Wells's phonetic blog*: Friday, 18 November 2011). This phenomenon can occur across word boundaries as well. For instance, 'went away' may be pronounced /wenəweɪ/ (Cruttenden 2008: 304). In the same way, 'want to' /wɑːnt tə/ becomes /wanna/ and 'going to' /gouɪŋ tə/ becomes /gənə/ (Table 5).

/θ, ð/ elision in /θs, ðz/ sequences (Table 6): The dental fricatives /θ/ and /ð/ are often elided when followed by /s/ or /z/ (e.g. 'clothes' /kloʊz/, 'months' /mʌns/ or /mʌnts/ (Davenport and Hannahs 2005: 29, Cruttenden 2008: 196).

Elision of /v/ (Table 7): /v/ in 'of' may be elided when followed by a consonant, especially /ð/ (e.g. 'six of the best' /sɪks ə ðə best/). /v/ is sometimes elided before /m/ in the verbs 'give', 'have' and 'leave' (e.g. 'give me' /ɡɪ mi/ (Collins and Mees 1999: 212, *SCEP 2012 Hnadbook*: 67).

Elision of unstressed syllables (Table 8): Whole syllables may be elided, when the syllables are unstressed just after or before a stressed syllable when the elided syllable contains a consonant that is repeated in the following syllable, especially /r/ (e.g. 'library' /laɪbreri/ /laɪbri/) (Crystal 2006: 158, Skandera 2011: 96). The initial unstressed syllable may be dropped (e.g. 'because' /bɪkʌz/⇒/kəz/).

3.3. Elision of consonants in weak forms of unstressed function words

Function words have both a strong form (i.e. stressed citation form) and one or more weak forms, and they are normally unstressed and pronounced in their weak forms. When reduced in connected speech, a vowel often reduces to schwa /ə/ or may be elided (e.g. 'can' /kæn/⇒/kən/, /kn/; 'our' [aʊə]⇒[ɑːr]). Some function words may have consonantal elision. Loss of an initial consonant sound includes /h/ dropping that occurs to pronouns and auxiliary verbs with an initial /h/ (e.g. 'he', 'his', 'him', 'her', 'have', 'has', 'had') and 'th' dropping of 'them'. Loss of a final consonant includes /v/ dropping of the preposition 'of' and /d/ dropping of the conjunction 'and' (Celce-Murcia 1996: 230, Brown and Brown 2006: 3) (Table 9). Some function words sound almost identical when reduced in connected speech, which causes difficulty for L2 learners in listening comprehension. For example, 'Did you see him/them?' are both pronounced [dɪdʒəsiːʃəm] (Celce-Murcia 2010: 376). Table 10 shows some function words that sound alike in reduced speech.

4. Inaudible release of plosives in word-final positions before a pause

Words in English often end with a consonant or a cluster of consonants, and this sometimes causes difficulty for Japanese learners of English, especially when the final consonant is a plosive. Both voiced and voiceless plosives /p, t, k, b, d, g/ are released inaudibly when they come at the end of a word before a pause (e.g. 'top', 'late', 'back', 'rob', 'bad', 'big'). The closure is released slowly and gently so that the release cannot be heard (Knight 2012: 151, Hagen 1988: 1). When the final plosive is preceded by a vowel, vowel length is the only cue to tell whether the plosive is voiced or voiceless. A vowel before a voiced plosive is generally longer than a vowel before a voiceless one. For example, /ɪ/ in 'pig' /pɪɡ/ is longer than that in 'pick' /pɪk/ (Celce-Murcia 2010: 79). The /aɪ/ in 'right' /raɪt/

is much shorter than that in ‘ride’ /raid/ and ‘rye’ /rai/ (Roach 2000: 36).

Table 9. Elision of consonants in weak forms of function words

Function Words	Strong Form	Weak Form	
Pronouns (loss of initial /h/ and /ð/ in pronominal forms)			
he	/hi:/	/hi/ /i:/ /i/	‘Where did he go?’ ⇒ /dɪdi:/, /di:/
his	/hɪz/	/ɪz/	‘They found his car.’ /hɪz/ ⇒ /ɪz/
him	/hɪm/	/ɪm/ /əm/	‘Tell him.’ /hɪm/ ⇒ /ɪm/
her	/hə/	/ə/	‘I’ll ask her.’ /hə/ ⇒ /ə/
them	/ðem/	/ðəm/ /əm/	‘I’m waiting for them.’ /ðəm/ ⇒ /əm/
Prepositions (loss of final consonant)			
of	/ʌv/	/əv/ /ə/	‘cup of tea’ ⇒ /kʌpəti:/
Conjunctions (loss of final consonant)			
and	/ænd/	/ənd/ /ən/ /n/	‘you and I’ ⇒ /juənai/, /jənai/
Auxiliary Verbs (loss of initial /h/)			
have	/hæv/	/həv/ /əv/ /v/ /ə/	‘could have been’ ⇒ /kədəbɪn/
has	/hæz/	/həz/ /əz/ /z/	‘Has it’ ⇒ /(ə) zɪt/

Table 10. Function words that sound alike in reduced speech

him	[əm]	as	[əs]	or	[ə]	a	[ə]	in	[ən][n]				
them		is		are		of		on					
						have		an					
								and					

(Cited from Celce-Murcia 2010: 377)

5. Consonant-to-consonant linking in C+C sequence

Consonant-to-consonant linking at word boundaries has three types that cause difficulty in listening comprehension. The first type is geminate consonant linking, where the C+C sequence with two identical consonants is pronounced as one long consonant (e.g. ‘less serious’ /les sɪriəs/⇒ /les:ɹiəs/). The second type is the inaudible release of final plosives before a consonant, where C+C sequence with a final plosive makes the plosive hard to hear because it may be unreleased, released inaudibly or replaced by a glottal stop, depending on the characteristics of the plosive and the following consonant. The third type is assimilation that changes a phoneme into another under the influence of the neighboring phoneme. For example, alveolar plosives /t/ and /d/ become bilabial plosives /p/ and /b/ or velar plosives /k/ and /g/, assimilating to the following bilabials or velars respectively. In the same way, voiced obstruents /v, z, ð, dʒ/ often become voiceless before a voiceless consonant (e.g. ‘have to’ /hæftə/). In jod coalescence, word-final /s/, /z/, /t, ts/ and /d, dz/ combine with the initial palatal glide /j/ of the next word to form a third sound /ʃ/, /ʒ/, /tʃ/ and /dʒ/ respectively (‘this year’ /ðɪjɪə/, ‘need you’ /ni:dʒu/). /t/ may be replaced by a glottal stop (e.g. ‘not yet’ [nɑʔ jet] instead of /natʃet/ in coalescent assimilation).

5.1. Geminate consonant linking

Two identical (geminate) consonants across word boundaries are usually pronounced as one long consonant (Table 11) (Celce-Murcia 2010: 167, Avery and Ehrlich 1992: 85). In a sequence of two identical plosives (e.g. 'good dog'), no separate release of the first plosive is made, resulting in one closing stage and one release stage with an approximately double length hold stage (Cruttenden 2008: 166).

Table 11. Geminate Consonants Linking

Plosives					
/p p/	⇒ /p:/	'stop playing'	⇒ sto[p:]laying	/b b/	⇒ /b:/
				'Bob brushed'	⇒ Bo[b:]rushed
/t t/	⇒ /t:/	'hot tea'	⇒ ho[t:]ea	/d d/	⇒ /d:/
				'red dress'	⇒ re[d:]ress
/k k/	⇒ /k:/	'take care'	⇒ ta[k:]are	/g g/	⇒ /g:/
				'big glass'	⇒ bi[g:]lass
Affricates					
/tʃ tʃ/	⇒ /tʃ:/	'rich children'	⇒ ri[tʃ:]ildren	/dʒ dʒ/	⇒ /dʒ:/
				'encourage Germans'	⇒ encoura[dʒ:]ermans
Nasals					
/m m/	⇒ /m:/	'from many countries'	⇒ fro[m:]any	/n n/	⇒ /n:/
				'Rain never falls.'	⇒ rai[n:]ever
Fricatives					
/f f/	⇒ /f:/	'knife for cutting'	⇒ kni[f:]or	/v v/	⇒ /v:/
				'five vacant rooms'	⇒ fi[v:]acant
/θ θ/	⇒ /θ:/	'both things'	⇒ bo[θ:]ings	/ð ð/	⇒ /ð:/
				'with them'	⇒ wi[ð:]em
/s s/	⇒ /s:/	'nice school'	⇒ ni[s:]chool	/z z/	⇒ /z:/
				'loves zebras'	⇒ love[z:]ebras
/ʃ ʃ/	⇒ /ʃ:/	'I wish she would come.'	⇒ wi[ʃ:]e	/ʒ ʒ/	(No word with initial /ʒ/)
Lateral					
/l l/	⇒ /l:/	'She will lend you money.'	⇒ wi[l:]end		

5.2. Plosive + consonant linking

The word-final plosive is usually not released when followed by a word that begins with a consonant, especially a plosive or an affricate (e.g. 'pet cat' [pet^ɾ kæt], 'big church' [big^ɾ tʃætʃ]) (Celce-Murcia 2010: 167, Avery and Ehrlich 1992: 85) (Table 12). The tongue or lips move to the place of articulation of the stop consonant and then move immediately to the place of articulation of the next consonant. In a homorganic plosive sequence with different voicing, the first plosive is unreleased or have incomplete plosion with the active articulator remaining in the same place for about twice as long as it would if there were only one plosive (e.g. 'big car', 'white dog') (Ashby 2011: 137-39, Cruttenden 2008: 166) (Table 13). Heterorganic plosive sequences (e.g. 'oak tree', 'dig deeply', 'back door') result in overlapping stages, where the first plosive is released but inaudible, being masked by the hold stage of the next plosive (Ashby 2011: 137-39).

/t/ may be replaced by a glottal stop when followed by a consonant, especially a homorganic consonant /t, d, s, z, ʃ, tʃ, dʒ, n, l, r/ (e.g. 'great smile' [grei^ʔ smail], 'at night' [ə^ʔ naɪt]) and other non-syllabic consonants /b, p, k, g, m, f, v, θ, ð, r, w, j, h/ (Cruttenden 2008: 180, Davenport 2005: 24-25). /p, k/ may be replaced by a glottal stop when followed by a homorganic plosive or nasal ('hip pockets', 'rock group', 'pop music') (Collins and Mees 2003: 153).

Table 12. Plosive + Consonant

	/p/	/b/	/t/	/d/	/k/	/g/
Plosives						
/p/	deep pond	web page	white post	good person	black pepper	big party
/b/	stop by	web browser	that boy	good boy	black book	big boy
/t/	keep track	lab test	white tie	good time	black tiger	big time
/d/	soap dish	rub down	white dog	good deal	black dog	big deal
/k/	pop culture	job creation	white cake	red cap	rock climbing	big cat
/g/	keep going	Bob got it	that girl	good girl	black god	big game
Affricates						
/dʒ/	grape juice	Bob jumped	great joke	good judge	black judge	big judgment
/tʃ/	top choice	superb choice	that chair	old church	pork chop	big church
Nasals						
/m/	stop me	rub me	not me	Good morning	black magic	big man
/n/	cheap nuts	rub now	not now	good news	black net	big nose
Fricatives						
/f/	pop fly	verb forms	not for me	bad foot	black feet	big feet
/v/	sharp vision	the job varies	not very	loud voice	black velvet	big valley
/θ/	keep thinking	Bob thought	what thing	old theater	black theater	big theater
/ð/	up the hill	rob this bank	out there	Would they?	crack the code	dig this hole
/s/	top secret	job seeking	great smile	said so	Black Sea	big smile
/z/	top zone	superb zoo	great zeal	good zoo	black zone	big zoo
/ʃ/	cheap shoes	superb shoes	right shape	good shoes	deck shoes	big shoes
/ʒ/	No such sequence: no word with initial or final /ʒ/ with few exceptions (e.g. 'beige')					
/h/	top half	job hunting	at home	good humor	black hair	big house
Glides						
/w/	top winners	Bob won	hot water	And what?	black woman	big wing
/r/	top row	lab records	that ring	vivid reminder	bank robber	big root
/j/	cheap yacht	superb year	not yet	and yet	back yet	big yacht
Lateral						
/l/	up late	rub lightly	at last	good luck	look like	big land

Table 13. Homorganic Plosive Consonant Linking with different voicing

Bilabia + Bilabial		
/p/ + /b/	'stop by'	⇒ stɒp bɪy ⇒ stɒʔ bɪy
/b/ + /p/	'web page'	⇒ weɪb pɪdʒ
Alveolar + Alveolar		
/t/ + /d/	'Sit down'	⇒ sɪt dʌʊn ⇒ sɪʔ dʌʊn
/d/ + /t/	'bad time'	⇒ bəd tɪm
Velar + Velar		
/k/ + /g/	'back garden'	⇒ bæk ɡɑːdn ⇒ bækʔ ɡɑːdn
/g/ + /k/	'big cat'	⇒ bɪɡ kæt

5.3. Assimilation of place of articulation

Assimilation is another strategy to simplify consonant clusters across word boundaries. One phoneme is changed into a different phoneme or a different allophone because of the influence of a nearby phoneme, causing a change in the place of articulation (the most familiar case is de-alveolarization, where alveolar consonants are de-alveolarized when followed by non-alveolar consonants), a change in voicing (Cruttenden 2008: 301, Brown 2006: 283, Roach 2009b: assimilation) or a change in the manner of articulation (e.g. ‘good night’ /gʊn naɪt/) (Rogerson-Revell 2011: 164). There are three types of assimilation in English: progressive (aka perseverative or lagging) (e.g. ‘in the corner’ /ɪn nə kɔːrnə/), regressive (aka anticipatory or leading) (e.g. ‘a bit much’ /ə bɪp mʌtʃ/, usually glottalized [ə bɪʔp mʌtʃ] or replaced with a glottal stop [ə bɪʔ mʌtʃ]) (SCEP 2012: 65), and coalescent (aka reciprocal) which results in yod coalescence (e.g. ‘need you’ /niːdʒu/). Assimilation may be total or partial. It is total in ‘ten mice’ /tem maɪs/, where the assimilating sound /n/ becomes identical with the conditioning sound /m/. It is partial in ‘ten bikes’, where /n/ becomes /m/, adopting the bilabiality of /b/ but not the plosiveness (Crystal 2006: 38).

5.3.1. Progressive assimilation

Progressive assimilation is most often found in the behavior of the plural suffix ‘s’, the third person singular suffix ‘s’, the possessive marker ‘s’, and the past tense suffix ‘-d’ (Table 14). They are voiced when the preceding consonant is voiced (e.g. ‘dogs’ /dɔgz/) and devoiced when preceded by a voiceless consonant (e.g. ‘docks’ /dɔks/). Except for the above cases, progressive assimilation is relatively uncommon. It may occur when a plosive is followed by a syllabic nasal (e.g. ‘happen’ /hæpm/, ‘second chance’ /sekŋ tʃæns/, with /n/ assimilating to the preceding bilabial /p/ and velar /k/ respectively) (Cruttenden 2008: 303) (Table 15). It also occurs to the word-initial /ð/ in unstressed words, which often assimilates entirely to a preceding alveolar sound /n, l, s, z/ (e.g. ‘in the’ /ɪnnə/) (See 5.6. Assimilation of manner of articulation).

Table 14. Progressive assimilation of voice with suffixes

	voiced		voiceless	
Plural Morpheme	dogs	/dɔgz/	docks	/dɔks/
Third Person Singular	believes	/bɪli:vz/	puts	/pʊts/
Possessive Marker	John’s	/dʒənz/	Jack’s	/dʒæks/
Past Tense	moved	/mu:vd/	worked	/wɜkt/

Table 15. Progressive assimilation: plosive + syllabic nasal

/n/ ⇒/m/	‘happen’ [hæpən] ⇒[hæpm] (See: Table 3 Syllabic Consonants)
/n/ ⇒/ŋ/	‘bacon’ [beɪkən] ⇒[beɪkŋ]

5.3.2. Regressive assimilation

In regressive assimilation, the first consonant takes the characteristics of the following consonant (e.g. ‘that boy’ /ðæp bɔɪ/). Word-final /t, d, n, s, z/ readily assimilate to the following word-initial

consonant while keeping the original voicing (Cruttenden 2008: 301), and the first consonant becomes more like the second one (Avery1992: 87). Alveolars /t/, /d/ and /n/ are replaced by bilabials /p/, /b/ and /m/ respectively before bilabial consonants /p, b, m/ (Table 16), and by velars /k/, /g/ and /ŋ/ respectively before velar consonants /k, g/ (Table 17). The alveolar plosive /t/ may be replaced by a glottal stop when followed by bilabials /p, b, m/ and by velars /k, g/ (Tench 2011: 91). Alveolar fricatives /s/ and /z/ are replaced by palato-alveolars /ʃ/ and /ʒ/ respectively before consonants containing a palatal feature (/j, ʃ, tʃ, dʒ/) (Tench 2011: 92, Roach 2009b: palatalisation) (Table 18). Alveolars /t, d, n, l/ get closure at the teeth to become dental plosives [t̪, d̪], dental nasal [ɳ], and dental lateral [l̪] when they are followed by a dental fricative /θ/ or /ð/ (dentalization, cf. 5.6 Assimilation of manner of articulation: progressive assimilation involving /ð/) (Cruttenden 2008: 216, 297-98, Roach 2000: 139-40, Giegerich 1992: 214-15) (Table 19).

Gemination occurs when assimilation is total, and two geminate consonants are pronounced in a single articulation of double length. Gemination occurs in the following cases: 1) when the word-final /d/ is followed by a word beginning with /b/ and /g/ (e.g. ‘good boy’ /gʊd bɔɪ/⇒/gʊb bɔɪ/ with double /bb/, ‘good girl’ /gʊd gɜ:l/⇒/gʊg gɜ:l/ with double /gg/); 2) when the final /n/ is followed by a word-initial /m/ (e.g. ‘thirteen men’ /θɜ:ti:n men/⇒/θɜ:ti:m men/ with double /mm/); 3) when the final /s/ is followed by an initial /ʃ/ (e.g. ‘this shop’ /ðɪs ʃap/⇒/ðɪʃ ʃap/ with double /ʃʃ/) (Tench 2011: 89-92). The final /t/ is now often replaced by a glottal stop with no possibility of assimilation when it is followed by an initial bilabial /p, b, m/ or velar /k, g/ (e.g. ‘not bad’ /nɒt bæd/) (Tench 2011: 91).

Alveolar plosives /t/ and /d/ remain plosives after assimilating to the following bilabials and velars. They are unreleased and hard to hear when followed by homorganic consonants. Assimilation of alveolar nasal /n/ to the following bilabials and velars resulting in /m/ and /ŋ/ do not cause much difficulty for Japanese learners since similar phenomena happen to uvular nasal /ɴ/ in Japanese. /ɴ/ is often realized as /m/, /n/ and /ŋ/ assimilating to the following bilabials, alveolars and velars respectively (e.g. /sanpo/⇒/sampo/, /bento/⇒/bento/, /benkyo/⇒/benkyo/).

Table 16. Alveolars ⇒ Bilabials

Alveolar /t//d//n/ + Bilabial /p, b, m/ ⇒ /p//b//m/		
/t/ ⇒ /p/	/p/	‘that person’ ⇒ tha[p] p erson (Double /pp/) ‘hot potato’ ⇒ ho[ʔ] p otato
	/b/	‘that boy’ ⇒ tha[p] b oy ‘not bad’ ⇒ no[ʔ] b ad
	/m/	‘that man’ ⇒ tha[p] m an ‘right mess’ ⇒ righ[ʔ] m ess
/d/ ⇒ /b/	/p/	‘good pen’ ⇒ goo[b] p en
	/b/	‘good boy’ ⇒ goo[b] b oy ⇒ goo[b:]oy (Double /bb/)
	/m/	‘good man’ ⇒ goo[b] m an
/n/ ⇒ /m/	/p/	‘ten ponies’ ⇒ te[m] p onies
	/b/	‘ten boys’ ⇒ te[m] b oys
	/m/	‘ten men’ ⇒ te[m] m en ⇒ te[m:]en (Double /mm/)

Table 17. Alveolars ⇒ Velars

Alveolar /t/ /d/ /n/ + Velar /k, g/ ⇒ /k/ /g/ /ŋ/				
/t/ ⇒ /k/	/k/	'that case'	⇒ tha[k k]ake (Double /kk/)	'white cross' ⇒ whi[ʔ k]ross
	/g/	'that good'	⇒ tha[k g]ood	'eight goals' ⇒ eigh[ʔ g]oals
/d/ ⇒ /g/	/k/	'bad king'	⇒ ba[g k]ing	
	/g/	'bad girl'	⇒ ba[g g]irl ⇒ ba[g:]irl (Double /gg/)	
/n/ ⇒ /ŋ/	/k/	'ten cakes'	⇒ te[n k]akes	
	/g/	'ten girls'	⇒ te[n g]irls	

Table 18. Palatalization of alveolar fricatives

Alveolar Fricative /s/ /z/ + /j, ʃ, tʃ, dʒ/ ⇒ /ʃ/ /ʒ/				
/s/ ⇒ /ʃ/	/j/	'this year'	⇒ thi[ʃ j]ear /ðɪʃ jɪə/ or /ðɪʃɪə/ (coalescence) (Knight 2012: 215)	
	/ʃ/	'this shop'	⇒ thi[ʃ ʃ]op ⇒ thi[ʃ:]op (Double /ʃʃ/)	
	/tʃ/	'this chair'	⇒ thi[ʃ tʃ]air	
	/dʒ/	'this job'	⇒ thi[ʃ dʒ]ob	
/z/ ⇒ /ʒ/	/j/	'these years'	⇒ the[ʒ j]ears	
	/ʃ/	'these shops'	⇒ the[ʒ ʃ]ops	
	/tʃ/	'these chairs'	⇒ the[ʒ tʃ]airs	
	/dʒ/	'these jobs'	⇒ the[ʒ dʒ]obs	

Table 19. Dentalization of alveolars (Giegerich 1992: 215)

Alveolar /t/ /d/ /n/ /l/ + Dental fricative /θ, ð/ ⇒ [t̪] [d̪] [n̪] [l̪]				
/t/ ⇒ [t̪]	/θ/	'at three'	⇒ a[t̪ θ]ree	
	/ð/	'not that'	⇒ no[t̪ ð]at	
/d/ ⇒ [d̪]	/θ/	'bad thing'	⇒ ba[d̪ θ]ing	
	/ð/	'hide them'	⇒ hi[d̪ ð]em	
/n/ ⇒ [n̪]	/θ/	'in theory'	⇒ i[n̪ θ]eory	
	/ð/	'in that'	⇒ i[n̪ ð]at 'in the' [ɪn̪n̪ə] (Roach: 140)	
/l/ ⇒ [l̪]	/θ/	'sell things'	⇒ se[l̪ θ]ings	
	/ð/	'sell them'	⇒ se[l̪ ð]em	

5.4. Final obstruent devoicing

Voiced obstruents often become voiceless when they are followed by a voiceless consonant (Table 20). Assimilation of voice is always regressive across word boundaries and is only of one type: the word-final voiced fricative /v, z, ð/ and affricate /dʒ/ become voiceless before a word-initial voiceless consonant (e.g. 'his students' hi[s s]tudent) (Roach 2000: 140-41, Tench 2011: 93-94, Imai 2007: 118). For example, final /v/ of 'have' in 'have to' may be partially devoiced [ɸ] (allophonic assimilation) or fully devoiced /f/ (phonemic assimilation: /hæf tə/). Similar phenomena are observed in Japanese as well. For example, 'beddo' (loan word from English 'bed') and 'baggu' (English 'bag') are often pronounced /betto/ and /bakku/.

Table 20. Final obstruent devoicing

Voiced obstruent + Voiceless consonant			
/v/ ⇒ /f/	/t/	'have to'	⇒ ha[f t]o
	/k/	'of course'	⇒ o[f k]ourse
	/s/	'move slowly'	⇒ mo[f s]lowly
	/f/	'We've found it.'	⇒ We[f f]ound it. (Double /ff/)
/z/ ⇒ /s/	/t/	'has to'	⇒ ha[s t]o
	/s/	'his students'	⇒ hi[s s]tudent (Double /ss/)
	/h/	'men's hat'	⇒ men[s h]at
/ð/ ⇒ /θ/	/s/	'with sugar'	⇒ wi[θ θ]ugar
	/θ/	'with thanks'	⇒ wi[θ θ]æŋks (Double /θθ/)
/dʒ/ ⇒ /tʃ/	/s/	'bridge score'	⇒ bri[tʃ s]core

5.5. Coalescent assimilation

In coalescent assimilation (jod coalescence), two consonants fuse into a new segment. The word-final alveolar /s/ and /z/ combine with the initial palatal glide /j/ of the next word to form palatalized fricative /ʃ/ and /ʒ/ respectively (e.g. 'this year' /ðɪs jɪə/⇒/ðɪʃɪə/; /ðɪʃ jɪə/ in regressive assimilation). In the same way, the final /t/ and /ts/ form affricate /tʃ/ (e.g. 'meet you' /mi:t ju/⇒/mi:tʃu/), and /d/ and /dz/ form affricate /dʒ/ (e.g. 'need you' /ni:d ju/⇒/ni:dʒu/) (Table 21). /t/ before /j/ can be replaced by either glottal stop /ʔ/ or post-alveolar affricate /tʃ/ (e.g. 'meet you'⇒/mi:ʔu/ or /mi:tʃu/) (Cruttenden 2008: 180, Roach 2009: 111, Tench 2011: 91, 93).

Table 21. Coalescent assimilation

Palatalization: Final alveolar consonant /s, z, t, ts, d, dz/ + initial palatal /j/			
/s/	/j/	⇒ /ʃ/	'miss you' /mɪs ju:/ ⇒ /mɪʃu/
/z/		⇒ /ʒ/	'He knows your name.' /nəʊz jə/ ⇒ /nəʊʒə/
/t/		⇒ /tʃ/	'Not yet' /nɒt jet/ ⇒ /nɒtʃet/ or [nɒʔ jet]
/ts/			'He hates you.' /heɪts ju/ ⇒ /heɪtʃu/
/d/		⇒ /dʒ/	'I need you.' /ni:d ju/ ⇒ /ni:dʒu/
/dz/			'She needs you.' /ni:dz ju/ ⇒ /ni:dʒu/

5.6. Assimilation of manner of articulation

Assimilations may involve a change in the manner of articulation when a consonant is followed or preceded immediately by a homorganic (or roughly homorganic) consonant at word boundaries (e.g. 'good night' /gʊn naɪt/, 'in the' /ɪn ðə/ or /ɪnnə/, 'give me' /gɪv mi:/⇒/gɪmɪ/) (Cruttenden 2008: 300, 304, Rogerson-Revell 2011: 164, Collins and Mees 2003: 205) (Table 22). The nasalized assimilated form may be elided altogether (e.g. 'good night' /gʊn naɪt/⇒/gʊnnaɪt/) (Cruttenden 2008: 300). A final plosive becomes a fricative or nasal. For example, the alveolar plosives /t/ in 'that side' and /d/ in 'good news' become alveolar fricative /s/ (/ðæt saɪd/⇒/ðæs saɪd/) and alveolar nasal /n/ (gʊd nu:z/⇒/gʊn nu:z/) respectively, assimilating to the manner of articulation of the following consonant

(Roach 2000: 140).

The word-initial /ð/ in unstressed words, which is restricted to a small set of function words, often assimilates entirely to a preceding alveolar sound /n, l, s, z/ (e.g. ‘in the’ /ɪnnə/) (Collins and Mees 2003: 209, Davenport and Hannahs 2005: 29, Cruttenden 2008: 196). In stressed syllables, no assimilation of /ð/ occurs when /ð/ is preceded by plosives /p, b, t, d, k, g/, though /t/ and /d/ may become a dental before /θ, ð/ (e.g. ‘get them’ [geʔ t̪ ðəm], ‘read these’ [ri:ð ði:z]). /t/ may be realized with strong glottal reinforcement [ʔt̪] or more probably is replaced by a glottal stop (e.g. ‘get the paper’ [geʔ t̪ ðə peɪpə], ‘hit this ball’ [hɪʔ ðɪs bɔ:ɪ]) (Collins and Mees 2003: 205, 209).

Table 22. Assimilation of manner of articulation

Regressive Assimilation				
Alveolars				
/t/	⇒ /s/	/s/	‘that side’	⇒ tha[s s]ide
	⇒ /z/	/z/	‘that zoo’	⇒ tha[z z]oo
	⇒ [t̪] or [ʔ]	/ð/	‘get them’	⇒ [geʔ t̪ ðəm], [geʔ t̪ ðəm] or ge[ʔ ð]em
/d/	⇒ /n/	/n/	‘good news’	⇒ goo[n n]ews or goo[n]ews (Elision)
	⇒ /s/	/s/	‘good song’	⇒ goo[s s]ong
	⇒ /z/	/z/	‘bad zone’	⇒ bad[z z]one
	⇒ /b/ ⇒ /m/	/m/	‘good morning’	⇒ goo[b m]orning⇒ goo[m m]orning
	⇒ /d̪/	/ð/	‘read these’	⇒ rea[d̪ ð]ese, rea[ʔ ð]ese
/z/	⇒ /n/	/n/	‘doesn’t know’	⇒ doe[nn (t) n]ow
Bilabial (See 3.2 Table 7. Elision of /v/)				
/v/		⇒ /m/	/m/	‘have mine’ ⇒ ha[m m]ine
Progressive Assimilation involving /ð/				
/n/	/ð/	⇒ /n/	‘turn the key’	/t̪ə:n ðə ki:/⇒/t̪ə:n nə ki:/
/l/		⇒ /l/	‘all the time’	/ɑ:l ðə taɪm/⇒/ɑ:l lə taɪm/
/s/		⇒ /s/	‘what’s the point?’	⇒ What[s s]e point
/z/		⇒ /z/	‘Is there any beer?’	⇒ i[z z]ere any beer?

6. T-voicing (Intervocalic alveolar flapping)

In North American English, the intervocalic /t/ is pronounced like /d/ when the preceding vowel is stressed, except that the tongue touches against the alveolar ridge only very briefly (Avery and Ehrlich 1992: 41-43, Celce-Murcia 2010: 80-81). For instance, ‘cut it out’ /kʌt ɪt aʊt/ is realized as /kʌɾ ɪɾ aʊt/. T-voicing causes listening discrimination problems since some different words sound identical: e.g. putting/pudding, latter/ladder, writer/rider, etc.

7. What causes difficulty in listening comprehension

50 dictation questions are prepared out of an American situation comedy *Family Ties* and given to 44 Japanese college students to examine what types of connected speech cause difficulty in listening

comprehension. One or two words in a sentence are missing and the participants are requested to fill out each blank with one word. Two blank spaces are given for contraction forms (e.g. 'don't', 'wanna') and participants are asked to provide uncontracted forms (e.g. 'do not', 'want to').

Among 50 questions (listed at the end of this article), less than 41 percent of the participants answered correctly for the following four. The questions (15) and (34) are prepared to see if they recognize the word boundaries in VC+V sequence, and (49) and (1) to see if they recognize weak forms of function words.

- | | |
|--|--------------------------------|
| (15) This is (on) (our) coffee table. | (VC+V) |
| (34) I've been meaning to put (one) (out) there. | (VC+V) |
| (49) Yeah, this (will) do fine. | (function words) |
| (1) Here (he) comes, here (he) comes. | (function words: /h/-dropping) |

'On our' in (15) is a VC+V sequence at the word boundary and is pronounced /ɑ:nəʊə/ in citation form and /ɑ:nɑ:r/ in the weak form. Only 7 out of 44 students (15.9%) answered correctly. 18 out of 37 who gave a wrong answer filled in the blanks with 'on the', which is realized in connected speech as /ɑ:n nə/ with /ð/ assimilating to the preceding nasal /n/. 15 students answered 'on a' realized as /ɑ:nə/, which sounds almost identical to 'on the' /ɑ:n nə/. There is a difference between 'on the' and 'on a' in the placing of the rhythm group boundary and the lengthening of the previous segment (Collins and Mees 2003: 209). However, it is hard to expect L2 learners to tell the slight difference between the two. 90.9% of the students (40=7+18+15) recognize the word boundary, which is shown by their responses that /n/ comes at the end of the word. The difficulty seems to come from the students' unfamiliarity with the weak form of the function word 'our', which is realized as /ɑ:r/, rather than the VC+V sequence.

'One out' /wʌn aʊt/ in (34) is also a VC+V sequence. 11 students (25%) answered correctly. 23 out of 33 students who answered incorrectly provided 'on', 'one' or 'in' as part of their answers, including 7 with 'one of' and 4 with 'on a'. This means that 34 (11+23) out of 44 students (77.3%) recognize the word boundary. The difficulty probably comes from the C+C sequence of 'out there', which makes the final plosive /t/ hard to hear, with /t/ being followed immediately by another consonant /ð/. Only 8 out of 33 students (24.2%) heard /t/ in one way or another (e.g. 'out', 'it', 'about'). The difficulty probably comes from the unreleased final plosive in the C+C sequence rather than the VC+V sequence.

For 'will' in (49), 16 students (36.4%) answered correctly. 9 out of 28 who answered incorrectly provided 'is' and 6 'would'. The difficulty is probably caused by the contraction of 'will'. For 'he' in (1), 18 students (40.9%) answered correctly. 15 out of 26 who gave a wrong answer gave 'we' and 4 'it', and no one heard the initial /h/ sound. They did not recognize the /h/ dropping of 'he'. These results show that weak forms of function words and elision of /t, d/ in consonant cluster are difficult for Japanese learners.

For the following six questions, more than 90 percent answered correctly. For the questions (13) and (36), 43 out of 44 (97.7%) answered correctly. For (2), (9), (22) and (23), 41 students (93.2%) answered correctly. Questions (13), (22) and (23) are prepared to see if they recognize the

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inaudible release of plosives in word-final positions before a pause (at the end of a sentence in these cases), (36) to check if they notice inaudible plosives in the C+C sequence at word boundaries, (2) to see if they hear a dental fricative /ð/ in a C+C sequence, and (9) to see if they recognize T-voicing. These results show that the inaudible release of plosives both in word-final positions and in the C+C sequence, C+C linking without a plosive, and T-voicing do not cause much difficulty to the participants.

(13) Why (not)?	(inaudible plosive in word-final position)
(36) We'll (get) friendly later.	(inaudible plosive in C+C)
(2) Brian, stay (with) me.	(C+C linking)
(9) Willie, (what) (is) it?	(T-voicing)
(22) Well, they (could).	(inaudible plosive in word-final position)
(23) I don't think they (would).	(inaudible plosive in word-final position)

8. Concluding Remarks

Participants' responses to the 50 dictation questions show that they find weak forms of function words and elision of /t, d/ in consonant cluster difficult, while they find the inaudible release of plosives both in word-final positions and in C+C sequence, C+C linking without a plosive and T-voicing easy. This conclusion is tentative and more data is required to make a conclusive argument about what types of connected speech Japanese learners of English find difficult. Also the classification of connected speech presented in this article may need further refinement to find what causes difficulty in listening comprehension for Japanese learners of English.

50 Dictation Questions

1. Here (he) comes, here (he) comes.	26. Can I (make) (a) suggestion?
2. Brian, stay (with) me.	27. Well, if it's (not) (too) much trouble...
3. Let's (put) (it) over here.	28. (Read) (my) lips.
4. (Not) (on) the couch.	29. (It) talks.
5. Lynn, clear (off) the coffee table.	30. It's heavy, it's hairy (and) (it) talks.
6. (Quick), it's heavy.	31. I mean, (not) (tonight).
7. I (can) (not) believe it.	32. You (could) use a light in that driveway.
8. What do you think (it) (is)?	33. You could use a light (in) (that) driveway.
9. Willie, Willie, (what) (is) it?	34. I've been meaning to put (one) (out) there.
10. Brian's (right). It's an ALF.	35. Hey, there's no need (for) name-calling.
11. That's short (for) "alien life form."	36. We'll (get) friendly later.
12. Can ALF stay (in) (my) room?	37. You (got) a cat?
13. Why (not)?	38. You (eat) (cats)?
14. E.T. (got) (to) stay.	39. You (can) (not) eat Lucky.
15. This is (on) (our) coffee table.	40. (Not) (in) this house.
16. After all those years (of) wondering and hoping...	41. How (about a) cat-food can?
17. We've gotta (get) (rid) (of) it.	42. I (could) use the roughage.
18. We don't know anything (about) (it).	43. We're going (with) (you).
19. We (had) (better) report it to the authorities.	44. Isn't (that) amazing?
20. But (what) (if) the authorities do something to it?	45. ...will you come down to Earth (for) (a) (minute)?
21. (Would) they, Willie?	46. An alien being (has) come to live with us.
22. Well, they (could).	47. An alien being has come to live (with) (us).
23. I don't think they (would), but they could.	48. ...and eat our cans (and) snack on our cat.
24. ...and they (might).	49. Yeah, this (will) do fine.
25. We (have) (got) (to) report this.	50. Just (give) (me) one day, okay?

【付 記】

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